

Wastewater Treatment Division

Appendix A: Cost Avoidance Benefits

September 2002

Westin Engineering, Inc. Project 6251

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1. COST AVOIDANCE BENEFITS

1.1 Introduction

The results of the Computer Systems Planning Study are documented in this Computer Systems Master Plan, which consists of:

- Executive Summary
- Master Plan
- *Appendix A – Cost Avoidance Benefits*
- Appendix B – IT Staffing
- Appendix C – IT Standards
- Appendix D – IT Architecture
- Appendix E – Existing Condition Assessment
- Appendix F – Projects and Subprojects

The purpose of Appendix A is to show where the cost benefits will come from as a result of implementing the projects in the Computer Systems Master Plan (Master Plan), over the 10-year planning period, 2002 to 2011.

The following sections provide an explanation of the projects by type and the associated cost avoidance benefits:

- Upgrade and Replacement Projects
 - Plant and Conveyance Control Systems
 - Project Control
 - Water Quality Systems
 - Wide Area Network (WAN) and Local Area Network (LAN)
- New Projects
 - New Plant and Conveyance Control Systems
 - Water Quality Database
 - Asset and Maintenance Management Systems
 - Data Management Systems
 - Network Enhancement
- Deferred Projects
 - Water Quality Systems
 - Asset and Maintenance Management Systems
 - Data Management Systems
 - Training Support Systems
 - Business Support
 - Productivity Metrics
 - Network Enhancement

Each cost avoidance benefit identified is associated with a specific upgrade and replacement project or new project and includes:

- Hiring avoidance of new full-time employees (FTEs)
- Savings in operations and maintenance (O&M) costs
- Reduction in new infrastructure investments and replacement equipment procurement.

The Division has already taken significant steps toward streamlining its operations and has trimmed its staff to approximately 600 employees. By investing in these replacement and new improvement projects, the Division will be in a stronger position to reduce staff growth and meet productivity goals.

Also in this appendix are a brief overview of projects that are being deferred and a summary of the Division's Productivity Initiative, showing its relationship to the Master Plan.

1.2 Cost Benefits Summary

The King County Wastewater Treatment Division (WTD) has invested nearly \$80 million over the past 15 years to build and maintain its computer infrastructure, which now consists of some 75 applications. WTD's consultant, Westin Engineering, Inc., has identified substantial savings that have occurred as a result. Westin estimates that without this technology investment of \$80 million, the current operational budget of WTD would be approximately 25 percent larger. This represents substantial real savings to WTD and clearly indicates that these past technology investments represented sound business decisions.

Many of these computer systems have now reached an age at which they must be replaced soon so WTD can continue to operate at its current efficiency. In addition, new computer systems have been proposed to support new WTD programs and meet regulatory requirements.

WTD needs to determine not only which expenditures to make and in what order; it also must choose whether to begin to coordinate these new systems to form an integrated computer infrastructure. By implementing these projects in a planned fashion, WTD will see added benefits in staff efficiency and the availability of good quality information.

To gain this efficiency, WTD must do more than simply install new computer systems. These hardware and software purchases must be combined with changes in business practices that take advantage of the new tools.

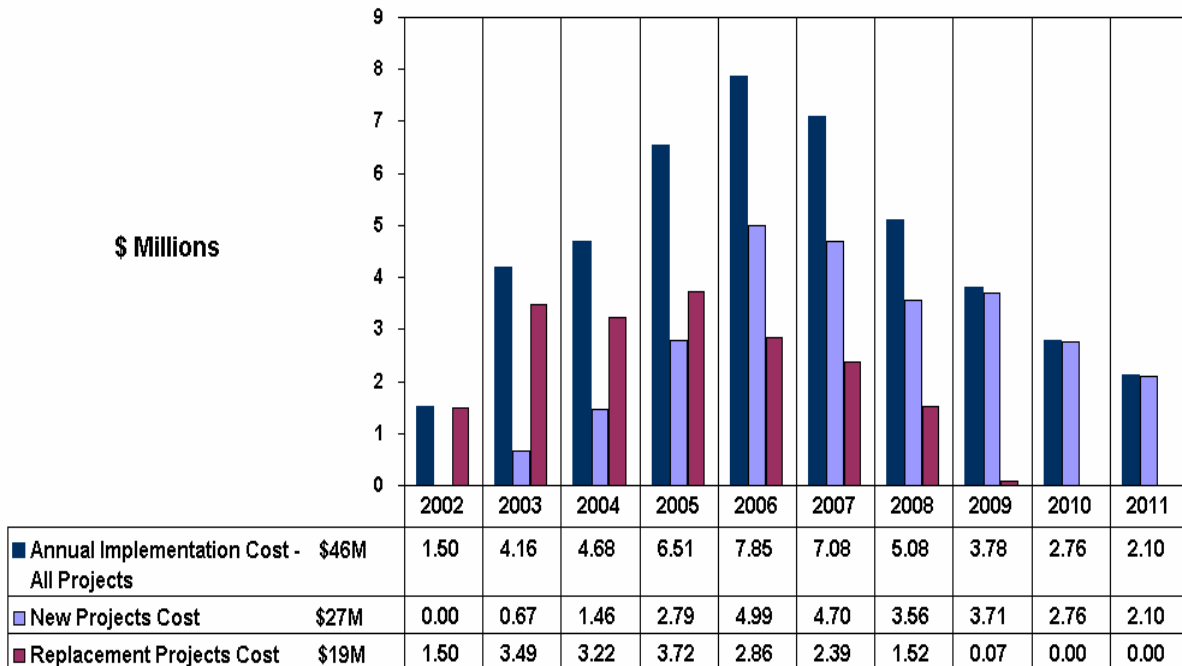
In the preservation of and improvements to its computer infrastructure, WTD management faces the decision to provide several forms of support:

- Financial support to purchase and implement recommended systems
- Support for changing business practices to take advantage of new opportunities for efficiency
- Adoption of a program implementation strategy that will begin today to build an integrated system.

Figure A-1 shows a total capital investment of \$46 million will be spent over the 10-year planning period. The investment profile shown matches the lower capital spending imposed by

the County during the first three years. The plan gradually increases to a moderate investment level as it progresses. The result of a low initial capital outlay gives the plan a pay-as-you-go character focused on the most critical projects first. The plan then invests in those projects contributing to improved business practices and positions WTD for long-term competitiveness.

Figure A-1: Program Implementation Cost



The Division has streamlined its operations through the effective use of technology, allowing WTD to operate its facilities with minimal staff over the last 15 years. Part of the streamlining efforts resulted in an experienced and highly effective maintenance organization capable of keeping this technology running and providing continued high levels of availability.

The downside of this situation, however, is that the existing technology has aged to the point that it has become unreliable. The maintenance staff has not grown, but it is challenged with increasing levels of maintenance to keep this technology working, along with a vanishing supply of spare parts and vendor support. Although the maintenance staff will keep the system running, there will be more frequent failures and longer downtime periods. During these failures, WTD will need to have real-time control systems in place to avoid overflows and respond to emergency conditions. Additional staff will be required during these times to operate facilities and provide the level of response and coverage that the automated systems had been providing.

The worst-case assessment of the additional resources needed to operate WTD facilities when these aging technologies fail is staggering. WTD would need to hire a substantial number

(approximately 100) of FTEs to respond to the worst-case scenario of all control systems failing and not being replaced. This case is not realistic, since WTD's maintenance organization would find a way to keep the bare minimum of control system capability in service. Therefore, the most realistic case assessment takes into account the "keep it working" attitude, and assesses the bare minimum of resources that would be needed during system failure conditions. Both the worst and realistic cases are presented in the cost-benefit assessments for selected replacement projects. The rest of the projects are assessed on the most realistic resource impacts.

Using the most realistic cost-benefit assessment for each of the replacement and new projects, the resulting cost avoidance from implementing the Master Plan projects is projected to be more than \$30 million through 2011, as summarized in Table A-1. As projects are completed, the benefits from each project were included in the cost avoidance numbers summarized in the table.

Table A-1: Cost Avoidance Summary

	Labor Cost Avoidance	Material Cost Avoidance	Total Cost Avoidance	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Replacement Projects Total Cost Avoidance	\$8,934,000	\$9,200,000	\$18,134,000	\$0	\$0	\$966,960	\$966,960	\$10,003,680	\$1,187,280	\$1,253,947	\$1,253,947	\$1,283,947	\$1,217,280
New Projects Total Cost Avoidance	\$4,381,920	\$7,793,760	\$12,175,680	\$0	\$0	\$0	\$73,440	\$226,440	\$707,040	\$1,157,040	\$2,968,920	\$2,999,520	\$4,043,280
Cost Avoidance from All Projects	\$13,315,920	\$16,993,760	\$30,309,680	\$0	\$0	\$966,960	\$1,040,400	\$10,230,120	\$1,894,320	\$2,410,987	\$4,222,867	\$4,283,467	\$5,260,560
Cumulative Cost Avoidance				\$0	\$0	\$966,960	\$2,007,360	\$12,237,480	\$14,131,800	\$16,542,787	\$20,765,653	\$25,049,120	\$30,309,680

A significant portion of the avoided costs comes from the replacement projects implementation and the assumption that the existing control systems will become unserviceable in the short term with the potential of being removed from service. The reality, however, is that the WTD maintenance personnel responsible for these systems are doing an excellent job today and will work hard to avoid a complete shutdown of these systems in the event of failure. They will strive to repair the failed parts the best they can. The end result will be degraded control system performance during normal operation with the potential for major operational breaches during event conditions. By adopting the Computer Systems Master Plan Program, WTD will reduce the potential for failure to an acceptable level and the continued high level of service WTD has achieved in the past will continue into the future. The replacement projects cost avoidance summary shown in Table A-1 realistically takes this into account in arriving at the anticipated cost benefits shown.

Tables A-2 and A-3 show where the cost avoidance is coming from and the impact on future Division resources.

Replacement Project Cost Avoidance:

Table A-2 shows that the replacement projects have the potential to:

- Avoid hiring \$8.9 million in labor resources over the next 10 years to take the place of plant and conveyance control systems that are currently operating in near failure condition, taking into account WTD's best efforts to keep them running.

- Avoid spending \$9 million in new conveyance system infrastructure projects and an additional \$200,000 in programmable logic control (PLC) equipment purchases by implementing the Master Plan replacement projects

This amounts to \$18.1 million in cost avoidance, as shown on Table A-2.

New Project Cost Avoidance:

Table A-3 shows that new projects will allow WTD to avoid hiring the work equivalent of \$4.4 million in labor resources and avoid spending an additional \$7.8 million in equipment procurement over the next 10 years. This would result in a total cost avoidance of \$12.2 million if the new projects are implemented.

Total Cost Avoidance:

WTD can avoid a total of \$30 million in costs by implementing the Master Plan replacement and new projects from 2002 to 2011. This would be realized by avoiding hiring over \$13 million in labor resources and avoiding purchasing \$17 million in infrastructure and equipment.

Table A-2: Summary of Replacement Project Cost Avoidance

		Labor Cost Avoidance	Material Cost Avoidance	Total Cost Avoidance
Replacement Projects Total		\$8,934,000	\$9,200,000	\$18,134,000
423R10	Replacement of Existing Plant and Conveyance Control Systems	\$8,874,000	\$9,200,000	\$18,074,000
423R10 / 101A	Interim Replacement of West Point SCS Control System	\$2,350,080	\$0	\$2,350,080
423R10 / 101B	Final West Plant and Conveyance Control System	\$0	\$0	\$0
423R10 / 102	CSO Predictive Model	\$0	\$9,000,000	\$9,000,000
423R10 / 103A	Interim Replacement of West Forney SCADA Control System	\$5,385,600	\$0	\$5,385,600
423R10 / 103B	Replacement of West SCADA PLCs	\$0	\$200,000	\$200,000
423R10 / 104	South Plant and East SCADA Forney Control Systems	\$918,000	\$0	\$918,000
423R10 / 106	ODSS Part I: Replaces LARS	\$220,320	\$0	\$220,320
423R30	Replacement of Existing Water Quality Systems - LIMS Upgrade	\$60,000	\$0	\$60,000
423R90	Existing LAN & WAN Upgrades	\$0	\$0	\$0

Table A-3: Summary of New Project Cost Avoidance

		Labor Cost Avoidance	Material Cost Avoidance	Total Cost Avoidance
New ProjectsTotal		\$4,381,920	\$7,793,760	\$12,175,680
423N10	New Plant and Conveyance Control Systems	\$61,200	\$0	\$61,200
423N10 / 107	ODSS Part II	\$61,200	\$0	\$61,200
423N10 / 108	ODSS Part III	\$0	\$0	\$0
423N10 / 109	Brightwater Plant and Conveyance Control Systems	\$0	\$0	\$0
423N30	New Water Quality Database	\$153,000	\$0	\$153,000
423N40	New Asset & Maintenance Management Systems	\$0	\$7,350,000	\$7,350,000
423N40 / 101	Asset Management System	\$0	\$3,600,000	\$3,600,000
423N40 / 102	Maintenance Mgt System: Part I	\$0	\$3,150,000	\$3,150,000
423N40 / 103	Maintenance Mgt System: Part II	\$0	\$600,000	\$600,000
423N50	New Data Management Systems	\$954,720	\$443,760	\$1,398,480
423N50 / 101	Engineering Document Mgt: Part I	\$514,080	\$0	\$514,080
423N50 / 102	Engineering Document Mgt: Part II	\$440,640	\$0	\$440,640
423N50 / 103	Engineering Document Mgt: Part III	\$0	\$443,760	\$443,760
423N50 / 104	Infrastructure Data Mgt: Part I	\$0	\$0	\$0
423N50 / 105	Infrastructure Data Mgt: Part II	\$0	\$0	\$0
423N50 / 106	West Point Facilities Data Repository	\$0	\$0	\$0
423N90	Network Enhancement Project	\$3,213,000	\$0	\$3,213,000
423N90 / 101	Information Portal: Part I	\$918,000	\$0	\$918,000
423N90 / 102	Information Portal: Part II	\$918,000	\$0	\$918,000
423N90 / 103	Information Portal: Part III	\$0	\$0	\$0
423N90 / 104	Integration Bus: Part I	\$918,000	\$0	\$918,000
423N90 / 105	Integration Bus: Part II	\$0	\$0	\$0
423N90 / 106	Mobile Connectivity: Part I	\$459,000	\$0	\$459,000
423N90 / 108	Mobile Connectivity: Part II	\$0	\$0	\$0

1.3 Upgrade and Replacement Projects Benefits

The benefits from the four replacement projects are presented in this section. Each of these projects is essential to WTD's continued efficient operation and must be implemented to avoid near-term staff increases and the risk of increased overflows during storm events. The replacement projects include:

- Plant and Conveyance Control Systems (Section 1.3.1)
- Project Control (Section 1.3.2)
- Water Quality Systems (Section 1.3.3)
- Wide Area Network (WAN) and Local Area Network (LAN) (Section 1.3.4)

1.3.1 Plant and Conveyance Control Systems Project Benefits

The plant and conveyance control systems allow staff to operate and control the treatment plants, conveyance regulator stations and pump stations. This project will maintain, upgrade and replace the existing systems.

The sequence consists of:

- 1. Interim Replacement of West Point SCS Control System, No. 10-101A.** Provides interim West Plant supervisory control system (SCS) and foundation to build on. Frees up MicroVax(es) for use at South Plant as spare parts, until the South Plant Control System is replaced and eliminates the need for the failing communications concentration module (CCM) and universal highway adapter (UHA) equipment in each of the 13 plant processes.
- 2. Interim Replacement of Forney West SCADA, No. 10-103A.** Provides interim West Collection System Supervisory Control and Data Acquisition (SCADA) system to replace the decommissioned Forney West SCADA. Reactive control capability remains, without any predictive control.
- 3. South Plant & East SCADA Forney Control System Replacement, No. 10-104.** Provides common requirements and design specifications for all WTD control systems, plus procures and implements this design for the South Plant and East Section Conveyance Control System replacement.
- 4. CSO Predictive Control Model, No. 10-102.** Provides combined sewer overflow (CSO) modeling development capability, as part of the West Plant Control System, to update existing CSO algorithms with and prepare for actual CSO predictive control to supplement the current CSO reactive control strategies that are now in use. Frees up MicroVax(es) for use at South Plant.
- 5. ODSS Part I: Replaces LARS, No. 10-106.** Develops requirements and design specifications for the replacement laboratory automated reporting system (LARS) and implements it as the first stage of WTD's Operational Decision Support System (ODSS).

- 6. Replacement of West Collection System TI PLCs, No. 10-103B.** West Collection System TI PLCs will be replaced with the same PLCs that are currently being procured for the East Collection System. Prior to the West PLCs being replaced, the decommissioned TI PLCs from the East will be used as spare parts in the West to extend their life.
- 7. Final West Plant & Conveyance Control System, No. 10-101B.** Provides for West Plant Control System replacement and for the West SCADA replacement as part of one combined system. This will result in a full-featured, advanced capability West Point Plant control system with complete West Collection System SCADA reactive and CSO predictive control capability.

Plant and Conveyance Control Systems Project Cost Avoidance

Failure of the existing plant and conveyance control systems will cause significant control problems at the plant and in the conveyance system. These problems could require a significant increase in staff to manually operate the plant and conveyance systems, if WTD maintenance personnel's best efforts are not able to repair and place these systems back in service in a timely manner.

It is becoming increasingly difficult to keep the control system and parts of the treatment plant interconnected and operational because:

- Software and hardware have aged to the point at which suppliers are no longer providing spare parts and software upgrades.
- Existing control systems are operating near the end of their original service life projections.
- Advances in technology are moving away from the technology used in the existing installed equipment; upgrades are not possible.

If the following systems are not replaced and are allowed to run to failure, additional labor resources will be required to continue operating the facilities that they support:

- Forney Offsite Control System at West Plant
- SCS West Plant Supervisory Control System
- Forney South Plant and Offsite (East) Control Systems
- LARS Water Quality Reporting System at South Plant.

The true benefit of these systems is not merely labor avoidance, but the automatic control that takes place during the events that plays a significant role in reducing overflows throughout King County. Without these control systems, WTD would only be able to partially meet the pollution control needs of the County.

Based upon two productivity workshops that Westin held with the plant and conveyance control workgroup, the following cost avoidance estimates were developed. They reflect plant and pump station staffing levels that would be required if the current control systems failed and the plant and conveyance systems had to be operated manually.

All labor calculations in Appendix A are based on the following average rate:

$$1 \text{ FTE} = \$29.42/\text{hr} * 2080 \text{ hr/yr} = \$61,200/\text{yr}$$

The following cost avoidance is projected as a result of implementing the subprojects associated with the Plant and Conveyance Control Systems Project.

Subproject: Interim Replacement of West Point SCS Control System, No. 10-101A

Cost Avoidance: West Point Plant operations labor.

Worst Case: Eight additional operators will be required to staff the West Point Plant three shifts per day if the SCS Plant Control System fails. Eight additional operators per shift equate to 24 FTEs per day, resulting in annual cost avoidance of \$1,468,800 per year. This value is for reference only and has not been used in the cost avoidance summaries in Section 1.2.

Realistic Case: It is assumed that WTD maintenance staff will continue to creatively keep the aging systems running and operations will continue to provide work-around plans that keep the facilities operating with minimum resource additions while repairs are being made. Based on these WTD best efforts, the worst case resource requirements have been decreased by 80 percent to reflect WTD's resilience in keeping the facilities running with minimum impact on staff while still meeting water pollution control goals. This is the basis of the most realistic cost avoidance to expect over the planning period.

For this subproject, a cost avoidance of \$293,760 per year is projected, for a total avoidance of \$2,350,080 through 2011 as shown in the cost avoidance table for the Plant and Conveyance Control Systems Project at the end of this section.

Subproject: Interim Replacement of Forney West SCADA, No. 10-103A

Cost Avoidance: West conveyance operations labor.

Worst Case: As the West Conveyance Control System continues to age and degrade, it will reach a point at which it cannot be relied on to perform its function of regulating sewage flows and preventing overflows to the environment. The system is near that point now and will require pump station operators to manually perform pump control actions and other functions at each regulator station if the computer system fails. The following additional operation costs will be avoided once this subproject is implemented:

- CSO cleanup of one overflow event per site per year: 1 FTE per day = \$61,200/year
- One additional operator per pump station per shift (18 pump stations): 54 FTEs per day = \$3,304,800/year
- No operators required at the 22 regulator stations.

This worst-case value is for reference only and has not been used in the cost avoidance summaries in Section 1.2.

Realistic Case: Based on WTD's best maintenance efforts, the worst-case resource requirements have been decreased by 80 percent to reflect WTD's resilience in keeping the facilities running with minimum impact on staff while still meeting water pollution

control goals. This is the basis of the most realistic cost avoidance to expect over the planning period.

For this subproject, a cost avoidance of \$673,200 per year is projected, for a total avoidance of \$5,385,600 through 2011 as shown in the cost avoidance table for the Plant and Conveyance Control Systems Project. This value is used in the cost avoidance summaries in Section 1.2.

Subproject: South Plant & East SCADA Forney Control System Replacement, No. 10-104

Cost Avoidance: South Plant operations labor.

Worst Case: Five additional operators will be required to staff the South Plant three shifts per day if the Forney Plant Control System fails. Five additional operators per shift equate to 15 FTEs per day, resulting in an annual cost saving of \$918,000. This value is for reference only and has not been used in the cost avoidance summaries in Section 1.2.

Realistic Case: Based on WTD's best maintenance efforts, the worst-case resource requirements have been decreased by 80 percent to reflect WTD's resilience in keeping the facilities running with minimum impact on staff while still meeting water pollution control goals. This is the basis of the most realistic cost avoidance to expect over the planning period.

For this subproject, a cost avoidance of \$183,600 per year is projected, for a total avoidance of \$918,000 through 2011 as shown in the cost avoidance table for the Plant and Conveyance Control Systems Project at the end of this subsection. This value is used in the cost avoidance summaries in Section 1.2.

Subproject: CSO Predictive Control Model, No. 10-102

Cost Avoidance: CSO infrastructure construction capital costs.

Realistic Case: This subproject will implement a new CSO Predictive Control Model that will operate as part of the West Conveyance Control System. Once it is implemented, it will allow WTD to avoid building \$9,000,000 in added conveyance infrastructure. The existing CSO model is out-of-date due to the changes in WTD's infrastructure that have occurred in recent years. This, plus the aging control systems, is already causing WTD to use more manual resources to control event conditions.

Without the control systems in operation, conveyance infrastructure will need to be built to provide 30 MGD of increased capacity. This added capacity will offset the 2 to 3.5 percent (1.4 billion gallons per year) reduction in CSOs that the automatic systems currently control. This estimate is based upon WTD cost models.

Subproject: ODSS Part I, Replaces LARS, No. 10-106

Cost Avoidance: Data analysis and reporting labor.

Worst Case: The existing systems used for the planning, scheduling and dispatching of plant and offsite facilities are outdated and fail to provide critical operations decision support information in a timely manner. The current LARS at South Plant originally was to be replaced in 1995 and is still in operation. It performs a number of these functions, but has significant reliability issues due to lack of vendor hardware and software support. It has reached the point at which it is no longer maintainable.

The information required for effective operations decision support is currently stored in a wide variety of disparate databases, including some that are standalone on individual desktop workstations. This project implements a standard set of computerized decision support software tools at each treatment plant.

The first implementation will be at South Plant. The operations decision support toolset will include:

- Set of standardized Web-based applications to provide an interface for users
- Standard SQL-compliant database for storing relevant decision support data
- Set of software tools for decision support that will be used not only for operations, but also for:
 - Asset management
 - Water quality management
 - Project control
 - Management and Division plant information reporting.

In addition to these software tools, applications designed to address the specific needs of operations will be developed and deployed. These applications will be Web-based and eventually deployed via the Information Portal described in Appendix D, IT Architecture, as part of the new projects, specifically the Network Enhancements Subproject.

The cost avoidance at South Plant is based on avoiding the cost of hiring three analysts to perform this work when the current LARS fails. The projected avoidance is 3 FTEs per day, or \$183,000 per year, for a total avoidance of \$1,120,000 through 2011. in the cost avoidance summaries in Section 1.2.

Realistic Case: Based on WTD's best maintenance efforts, the worst-case resource requirements have been decreased by 80 percent to reflect WTD's resilience in keeping the facilities running with minimum impact on staff while still meeting water pollution control goals. This is the basis of the most realistic cost avoidance to expect over the planning period.

For this subproject, a cost avoidance of \$36,720 per year is projected, for a total avoidance of \$220,320 through 2011 as shown in the cost avoidance table for the Plant

and Conveyance Control Systems Project at the end of this subsection. This value is used in the cost avoidance summaries in Section 1.2.

Subproject: Replacement of West Collection System TI PLCs, No. 10-103B

Cost Avoidance: West conveyance maintenance labor and capital funds management.

WTD will re-use the decommissioned TI PLCs from the East Conveyance Control System PLC replacement project as spare parts for the West Conveyance Control System PLCs. This will allow WTD to wait until 2004 to replace the aging West Conveyance Control System TI PLCs as part of this subproject.

The benefits from implementing this project are:

- Better capital and O&M cash flow management
- Extended service life of existing PLCs
- Spare parts availability for existing equipment.

A total cost avoidance of \$200,000 is estimated due to the above factors.

Subproject: Final West Plant & Conveyance Control System, No. 10-101B

Cost Avoidance: West Plant and conveyance operations labor.

Implementation of this subproject will replace the Interim West Plant Control System and the Interim West Conveyance Control System. Much of the interim system field equipment will be retained in the process of building a very flexible growth-oriented control system. The replacement system will be able to take full advantage of new process technologies and provide commonality of control equipment throughout WTD. Both the West and South Plant systems will use the same control technologies and set the standard for Brightwater's control system to follow. As a result, WTD will be able to:

- Cross-train operations and maintenance staff more easily between plants
- Maintain common spare parts at reduced inventory cost
- Use standard naming conventions Division-wide for control, monitoring, asset management and maintenance management
- Continue to avoid the additional staff required to run the plant and conveyance systems manually.

A number of potential savings are possible once all of the Plant and Conveyance Control Systems Project subprojects have been installed. These savings, summarized below, are cost saving opportunities that need to be explored during the design stage of this project. It is envisioned that the update of this plan three years from now will look strongly at changes in operating practices that result from experience gained with the replacement control systems. Some areas of potential savings include:

Potential Savings: Energy Cost. The WTD energy cost estimate for 2002 is \$19.2 million. The Environmental Protection Agency (EPA), the Water Environment Federation (WEF), and private utility sources estimate a 5 percent savings in energy costs

is being experienced in the wastewater industry due to use of control systems. This would amount to a \$960,000 per year potential cost savings for WTD if these capabilities were designed into the control systems. During the design phase of this project, the cost of implementing this capability versus the savings will be evaluated.

Potential Savings: Chemical Usage Cost. The WTD chemical cost estimate for 2002 is \$3.6 million. EPA, WEF, and private utility sources estimate a 5 to 10 percent cost savings has been experienced in the wastewater industry due to use of control systems. A 5 percent savings would result in \$180,000 per year in potential cost savings for WTD. During the design phase of this project, the cost of implementing this capability versus the savings will be evaluated.

Potential Savings: Processing Cost. The WTD estimated cost of all major processing in 2002 is \$27.3 million. EPA, WEF, and private utility sources estimate a 5 to 15 percent cost savings has been experienced in the wastewater industry due to use of control systems to optimize wastewater treatment processes. A 5 percent savings would result in a \$1,350,000 per year potential cost savings for WTD. During the design phase of this project, the cost of implementing this capability versus the savings will be evaluated.

This project will also provide the opportunities for improved WTD plant performance. The project will:

- Improve emergency response and management.
- Enhance water quality.
- Facilitate regulatory compliance.
- Lower maintenance costs of control systems. Replacement control systems will allow high maintenance, obsolete and hard-to-repair components to be decommissioned. However, the initial reduction in maintenance of new systems will be offset by the higher installation requirements of new systems. Thus, more capability is provided with the same or less maintenance.

Plant and Conveyance Control Systems Project Cost-Benefit Summary

The cost of this project is \$15,675,000, as summarized below:

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423R10	Replacement of Existing Plant and Conveyance Control Systems	\$15,675,000	\$2,000,000	\$2,910,000	\$2,875,000	\$3,480,000	\$2,015,000	\$1,630,000	\$765,000			
Sub Project No.	Sub Project Name											
423R10 / 101A	Interim Replacement of West Point SCS Control System	\$1,600,000	\$1,300,000	\$300,000								
423R10 / 101B	Final West Plant and Conveyance Control System	\$3,195,000					\$1,110,000	\$1,320,000	\$765,000			
423R10 / 102	CSO Predictive Model	\$1,785,000		\$360,000	\$715,000	\$710,000						
423R10 / 103A	Interim Replacement of West Forney SCADA Control System	\$800,000	\$300,000	\$500,000								
423R10 / 103B	Replacement of West SCADA PLCs	\$2,000,000			\$130,000	\$780,000	\$780,000	\$310,000				
423R10 / 104	South Plant and East SCADA Forney Control Systems	\$5,175,000	\$400,000	\$1,550,000	\$1,550,000	\$1,550,000	\$125,000					
423R10 / 106	ODSS Part I: Replaces LARS	\$1,120,000		\$200,000	\$480,000	\$440,000						

The realistic financial impact of not completing the Plant and Conveyance Control Systems Project and continuing to maintain existing systems with WTD's best maintenance efforts is \$18.1 million, as summarized below. This number could increase substantially if worst-case conditions are encountered and the experienced WTD maintenance staff run into failures which

are beyond repair. This project significantly contributes to the overall stability of the Division and supports the goal of becoming competitive with the private sector utilities in 10 years.

The gray-shaded years in the spreadsheet show the implementation phase for each subproject, followed by its contribution to cost savings by year.

Project No.	Project Name	Total Cost Avoidance	Material Savings	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423R10	Replacement of Existing Plant and Conveyance Control Systems	\$18,074,000	\$9,200,000	\$0	\$0	\$966,960	\$966,960	\$10,003,680	\$1,187,280	\$1,253,947	\$1,253,947	\$1,253,947	\$1,187,280
Subproject No.	Subproject Name												
423R10 / 101A	Interim Replacement of West Point SCS Control System	\$2,350,000	\$0			\$293,760	\$293,760	\$293,760	\$293,760	\$293,760	\$293,760	\$293,760	\$293,760
423R10 / 101B	Final West Plant and Conveyance Control System	\$0	\$0										
423R10 / 102	CSO Predictive Model	\$9,000,000	\$9,000,000					\$9,000,000					
423R10 / 103A	Interim Replacement of West Forney SCADA Control System	\$5,385,600	\$0			\$673,200	\$673,200	\$673,200	\$673,200	\$673,200	\$673,200	\$673,200	\$673,200
423R10 / 103B	Replacement of West SCADA PLCs	\$200,000	\$200,000							\$66,667	\$66,667	\$66,667	
423R10 / 104	South Plant and East SCADA Forney Control Systems	\$918,000	\$0						\$183,600	\$183,600	\$183,600	\$183,600	\$183,600
423R10 / 106	ODSS Part I: Replaces LARS	\$220,320	\$0					\$36,720	\$36,720	\$36,720	\$36,720	\$36,720	\$36,720

1.3.2 Project Control Project Benefits

The replacement Project Control System will allow the Division to meet the reporting requirements mandated in the Regional Wastewater System Plan (RWSP) and exceeds the capability of the existing Project Control System. The funding for this project is included in the RWSP; consequently, the funds needed to implement this project are not shown.

The work of developing the new replacement systems has already begun through a Program Management Services Contract with URS Construction Services. The recommendation of this planning study is that URS:

- Determine the project control system requirements for all of WTD.
- Establish standards for the project control systems to ensure system integration.
- Reduce the total number of project control systems from the current 14 system databases to three or four systems.
- Apply the computer technology architecture guidelines established in Appendix D for this project.
- Integrate the new computer systems developed into the Division-wide computer network presented in this Master Plan.

Also, Part I of the Engineering Document Management System described in section 1.4.4 of this appendix, is included as part of the Project Control Project. It establishes engineering document standards and document identification labeling standards. Additionally, it moves existing CAD files to Portable Document Format (PDF) files for viewing by appropriate staff throughout the Division via the Information Portal.

Project Control Project Cost Avoidance

Detailed cost avoidance analyses were not performed for this project. However, the initial review of its potential cost avoidance shows significant economies associated with being able to easily share information and avoid the duplicate data entry and lack of certifiable data verification that occurs today.

The current Project Control System consists of 14 FileMaker Pro databases that:

- Serve 200 users
- Track 700 projects (400 active)
- Process 1,000 progress payments each year
- Record and access historical information on 1,800 projects
- Receive financial information manually downloaded from the County's IBIS financial accounting system in order to produce and distribute over 300 reports each month.

Eliminating or reducing these manually driven tasks would reduce the need to hire 2 FTEs (\$122,400 per year), spread across several user groups over the planning period.

Note that these estimates are very conservative: Studies by the Gartner Group and others on the impact of data integration have emphasized productivity increases on the order of two to three times existing labor costs. These dramatic productivity increases are largely associated with the elimination of so-called "time wasters," such as time spent collecting and managing paper records, duplicate data entry, and reconciling and verifying data.

The cost avoidance associated with project control has not been included in the cost avoidance summaries noted in the Master Plan since RWSP is funding this project.

1.3.3 Water Quality Systems Project Benefits

The water quality systems allow staff to collect, analyze and report regulatory compliance data. This project will replace the existing water quality systems.

Water Quality Systems Project Cost Avoidance

This current Laboratory Information Management System (LIMS) at the Environmental Laboratory is operating adequately today, but will not continue to be supported by the software supplier. It is being phased out at most utilities and replaced with newer technology based on an open systems design. A new open system software LIMS product will need to be procured for long-term dependable operation of the Environmental Laboratory and the water quality database.

Subproject: LIMS Upgrade, No. 30- 101

Cost Avoidance: Laboratory staff support labor.

This project will upgrade the LIMS to avoid its impending technical obsolescence. The new upgraded LIMS will offer Web-based applications that are easier to maintain and deploy via the Information Portal. Cost avoidance will result due to:

- Lower software maintenance requirements
- Increased end-user productivity in the lab staff and WTD personnel who use this data
- Decreased training requirements
- Better support for the Water Quality Data Repository
- Faster and easier regulatory reporting.

A \$60,000 cost avoidance results from implementing this subproject. By using the Information Portal to publish new test results instead of the current browser applications, the Environmental Laboratory will avoid hiring 0.5 FTEs of Web development effort each year during the 10-year planning period.

Typical cost avoidance, as reported by the META Group and others, from using Web-based information portals to publish scientific data are in the range of 40 to 60 percent of total laboratory labor costs. These cost savings are attributed to eliminating work that laboratory workers are not particularly skilled or motivated to perform.

Water Quality Systems Project Cost-Benefit Summary

The cost of this project is \$910,000 as summarized below:

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423R30	Replacement of Existing Water Quality Systems - LIMS Upgrade	\$910,000						\$420,000	\$420,000	\$70,000		

This project is a base project needed to maintain a capability that already exists and is in jeopardy due to the existing systems supplier discontinuing support of its software.

The gray-shaded years in the spreadsheet below show the implementation phase for this project, followed by its contribution to cost avoidance by year. Work may begin earlier on this project due to funding from other divisions.

Project No.	Project Name	Total Cost Avoidance	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423R30	Replacement of Existing Water Quality Systems - LIMS Upgrade	\$60,000									\$30,000	\$30,000

1.3.4 Wide Area Network (WAN) and Local Area Network (LAN) Project Benefits

The WAN and LAN are the physical components of Division's computer infrastructure. The actual wires, fiber optic cables, routers and servers allow data to be transferred from point to point. This project will upgrade these components as required to serve new applications.

WAN and LAN Project Cost Avoidance

The expansion of the Division's networks using Gigabit Ethernet technology will provide a solid foundation for deploying Division-wide, Web-enabled databases and applications. Without this

expansion, the Division will not be able to maintain the quality of computing services required for normal Division business and operations.

Subprojects: Network Enhancements Parts I, II, & III, No. 90-1-1

Cost Avoidance: Mandatory subprojects providing support to all replacement projects.

The Division is currently using standard 10 Mbps Ethernet (or simply Ethernet) and 100 Mbps Ethernet (termed Fast Ethernet). However, in order to achieve the kind of performance required to effectively support the Division's Intranet, the Division's LANs need to be upgraded to 1,000 Mbps Ethernet (termed Gigabit Ethernet) in the short term and to 10,000 Mbps Ethernet (termed 10 Gigabit Ethernet) in the long term.

Gigabit Ethernet builds on top of the Ethernet protocol, but increases speed tenfold over Fast Ethernet. Since Gigabit Ethernet significantly leverages on the Division's existing Ethernet networking infrastructure, the Division will be able to leverage its existing knowledgebase to manage and maintain gigabit networks.

Linking all Division facilities to the County-wide I-NET is required in order to ensure that staff have access to all relevant databases and applications. The lack of pervasive Division-wide access to I-NET places significant constraints on staff productivity and efficiency. Once the Division has implemented Gigabit Ethernet on all LANs and WAN, the County-wide I-NET will provide network redundancy that will prove invaluable for disaster recovery.

This set of subprojects implements the gradual expansion of the Division's networks to keep pace with the constantly changing technologies being implemented over the next 10 years.

WAN and LAN Project Cost-Benefit Summary

The cost of this project is \$2,965,000 as summarized below:

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423R90	Exisitng LAN & WAN Upgrades	\$2,965,000			\$330,000	\$480,000	\$480,000	\$335,000	\$335,000	\$335,000	\$335,000	\$335,000

No cost avoidance has been identified for this project. The gray-shaded years in the spreadsheet below show the implementation phase for this project. This project is a foundation project that is mandatory in order to provide the network requirements needed by all the replacement projects noted in this Master Plan.

Project No.	Project Name	Total Savings	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423R90	Exisitng LAN & WAN Upgrades	\$0										

1.4 New Projects Benefits

The five new projects are presented in this section. These are tactical projects important to the Division's efficient operation in the near future and will better position it for the long term. They will enable WTD to avoid labor costs that will offset the capital investment shown in Figure A-1: Program Implementation Cost in Section 1.2 of this appendix. These avoided costs will contribute significantly toward enforcing the Division's Productivity Initiative plans.

Also included are growth projects such as the Brightwater Control System that will complement the replacement control system projects. It will follow the same operation and control standards and use the same functional design and procurement practices that will be developed for the East and West Section Plants.

The following new projects are included:

- New Plant and Conveyance Control Systems
- Water Quality Database
- Asset and Maintenance Management Systems
- Data Management Systems
- Network Enhancement.

1.4.1 New Plant and Conveyance Control Systems Project Benefits

The New Plant and Conveyance Control Systems Project will:

- Allow the computer systems associated with the RWSP plan to be integrated into the replacement control systems. The new plant and conveyance control systems are funded in the RSWP budget.
- Extend the initial capabilities developed in LARS and create a WTD-wide Operational Decision Support System to manage knowledge, not just data, and create essential operations and management decision support tools.

The WTD Division-wide computer system equipment standards, naming conventions, control and operation policies and procedures, local and remote plant and conveyance system control strategies and common control system design specifications base will have been developed by the time this project reaches the procurement stage. They are part of the Plant and Conveyance Control System Project described in Section 1.3.1. In the implementation of the earlier project, provisions will be made to provide some degree of remote control for the Brightwater Control and Conveyance System from either South Plant or West Point, in the design and procurement of those systems.

New Plant and Conveyance Control Systems Project Cost Avoidance

Subproject: Operations Decision Support System Part I & II, No. 10-107 & 10-108

Cost Avoidance: West and South Plant analysts labor.

The Operations Decision Support System will provide plant staff easy access to key operations and laboratory data, reports and other key plant information.

This information now requires analysts to collect and manually input it in a format that the requesting users can understand. It is time-consuming to prepare and takes days, rather than minutes, to obtain.

Studies by the META Group and the Forrester Group of the impact of similar decision support systems implemented at complex manufacturing plants have demonstrated cost savings through reductions in the number of new hires required to perform data analysis tasks as these productivity tools are deployed over time. These avoided costs are on the order of 2 to 5 percent of staff per plant, so the estimates here are far more conservative.

The cost avoidance comes from avoiding hiring 1 FTE = \$61,200/year:

- 0.5 FTE analysts from West Point
- 0.5 FTE analysts from South Plant.

Subproject: Brightwater Control System – North Plant, No. 10-109

Cost Avoidance: Brightwater Plant operations labor.

The Brightwater Control System project is not included in the cost of this Master Plan, nor are the benefits associated with it. A few comments are noted below to show how the projects in this Master Plan will augment the Brightwater Plant controls implementation and contribute to cost avoidance.

In the design of the Plant and Conveyance Control System Project (see Section 1.3.1), the replacement control systems will be able to fully communicate with the new control systems. The degree of remote control for Brightwater, if any, will be determined during its design and implementation.

At this time, no decision has been made by the RWSP project regarding remote control of the Brightwater system. Specific unit process requirements and safety factors must be taken into account as to whether remote control is warranted.

If the RWSP project determines that remote control is viable, significant cost avoidance is possible. For example, the Brightwater control system might be used as a local control tool during the day shift, when operations and maintenance staff are present, and as a remote control tool from West Point or South Plant during off-hours. The degree of cost avoidance will depend on the requirements that are currently being developed, which will determine the level of staff required to support this type of operation.

By developing common operation and control standards, as part of the Plant and Conveyance Control Systems Project (Section 1.3.1), WTD will be in a position to take full advantage of the commonality of control equipment. This will allow enforcement of standard operating procedures throughout all plant and conveyance systems.

New Plant and Conveyance Control Systems Project Cost-Benefit Summary

The cost of this project is \$1,480,000 as summarized below. This excludes the cost of Brightwater's Plant and Conveyance Control System, which is included in RWSP's budget.

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N10	New Plant and Conveyance Control Systems	\$1,480,000						\$130,000	\$130,000	\$470,000	\$375,000	\$375,000
Sub Project No.	Sub Project Name											
423N10 / 107	ODSS Part II	\$355,000						\$130,000	\$130,000	\$95,000		
423N10 / 108	ODSS Part III	\$1,125,000								\$375,000	\$375,000	\$375,000
423N10 / 109	Brightwater Plant and Conveyance Control Systems	\$0										

The cost avoidance associated with doing this Project is \$60,000 (\$30,000 per year) through 2011, as summarized below. This project will provide additional analysis support in the future in lieu of hiring new analysts.

The gray-shaded years in the spreadsheet below show the implementation phase for each subproject, followed by its contribution to cost avoidance by year, except for Brightwater, which were excluded due to its inclusion in the RWSP project.

Project No.	Project Name	Total Savings	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N10	New Plant and Conveyance Control Systems	\$61,200	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$30,600	\$30,600
Sub Project No.	Sub Project Name											
423N10 / 107	ODSS Part II	\$61,200									\$30,600	\$30,600
423N10 / 108	ODSS Part III	\$0										
423N10 / 109	Brightwater Plant and Conveyance Control Systems	\$0										RWSP

1.4.2 Water Quality Database Project Benefits

The new water quality database will serve as a warehouse for all water quality data collected in the Wastewater Program. It will provide a standardized way of looking at all water quality data and will collect it from all sources within WTD. It will be a certified database of high quality data. The entire WTD organization, as well as everyone with whom they exchange information, will use this tool to produce daily, weekly, monthly and annual reports and will use the information to make operation and maintenance decisions.

Water Quality Database Project Cost Avoidance

This project addresses the Division-wide need to capture and distribute the raw and derived data from laboratory analyses, including water quality information. Laboratory data is currently being generated by the Environmental Laboratory as well as by the process laboratories within each of the plants. This laboratory data has proven difficult to access by end-users, both at the plants and throughout the rest of the Division.

Currently, considerable manual labor is required for:

- Data input
- Data formatting
- Data calculations.

Subproject: Water Quality Data Repository, No. 30-103

Cost Avoidance: Laboratory staff labor.

The implementation of a Water Quality Data Repository will make it easier to input and access laboratory data and generate required reports for regulatory and other purposes. This will reduce the time and effort currently required to access laboratory information.

The cost avoidance associated with these time savings will result in improved productivity of existing staff, rather than a staff reduction that will show up in other WTD performance measurements.

The cost avoidance comes from not hiring 0.5 FTEs (\$30,600 per year), to accelerate the Web application development and deployment of water quality information. This will be accomplished by use of the Information Portal, which is easier to deploy and will require fewer additional resources.

Water Quality Database Project Payback

The cost of this project is \$1,330,000 as summarized below:

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N30	New Water Quality Database	\$1,330,000				\$665,000	\$665,000					

The cost avoidance resulting from this project is \$153,000 as summarized below. It contributes to WTD's overall long-term stability and goal of becoming competitive with the private sector utilities in 10 years.

The gray-shaded years in the spreadsheet show the implementation phase for each subproject, followed by its contribution to cost avoidance by year.

Project No.	Project Name	Total Savings	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N30	New Water Quality Database	\$153,000						\$30,600	\$30,600	\$30,600	\$30,600	\$30,600

1.4.3 Asset and Maintenance Management Systems Project Benefits

The asset and maintenance management systems will provide the computer systems required to implement the new Asset Management section.

Asset and Maintenance Management Systems Project Cost Avoidance**Subproject: Asset Management System, No. 40-101**

Cost Avoidance: Equipment replacement costs and maintenance labor.

Using an Asset Management System to support effective asset management within the Division generates a number of significant benefits:

- Increases asset life
- Reduces maintenance costs
- Improves scaleable asset reliability
- Focuses resources on critical assets
- Manages capital asset replacement schedule.

In addition to these business and operational benefits, the Asset Management System will enable the Division to become compliant with new, emerging regulations regarding the tracking and management of assets.

One set of new regulations is emerging from the Government Accounting Standards Board, or GASB, which establishes the Generally Accepted Accounting Principles (GAAP) for government agencies. In 1999, in response to pressure to drive government agencies to account for funds and assets in ways more consistent with GAAP, GASB issued Statement 34. GASB Statement No. 34 (or GASB-34) is not yet mandatory, but significant pressure from major government investors and the federal government are likely to result in mandatory requirements before long. In the meantime, GASB-34 compliance is a prerequisite to demonstrating GAAP compliance and a compliance implementation schedule is already published.

GASB-34 establishes a new framework or “reporting model” for state and local government financial reports, which represents a momentous change in public sector accounting. Of special significance to the Division, GASB-34 has become one of the primary justifications for implementing new and upgraded financial management, maintenance management and asset management systems by state and local government agencies.

In addition to the new regulatory demands coming from the GASB, there are also new regulatory demands coming from the Environmental Protection Agency. The EPA issued new guidelines for improved asset management by wastewater agencies and intends to make them mandatory. These emerging regulations revolve around two principal elements:

1. First, the EPA, in association with environmental consulting firms and specialists, issued the conceptual design for a comprehensive Environmental Management System (EMS). As the EPA envisions the role of the EMS in improved asset management in wastewater utilities, the EMS will serve as a repository of relevant data and reports about how general EPA regulatory compliance was achieved and whether or not the wastewater utilities can sustain its compliance. The EMS would

need to be directly accessible by any external agency, including state and federal environmental regulatory agencies. Technologically, the EMS is a data warehouse that automatically captures relevant data from information and controls systems within the utility, automatically organizes the data for reporting, and automatically categorizes and then publishes the environmental data over the Internet via an Information Portal.

2. Somewhat later, the EPA also issued guidelines for Capacity, Management, Operation and Maintenance (CMOM) audits by state environmental agencies and by the EPA. These audits would in effect require wastewater utilities to prove that they are taking an optimized approach to the management of their assets and operations. It is generally understood that CMOM audits would require wastewater utilities to have an integrated, utility-wide set of applications and databases that provide even more data and automated reporting and publication than the original EMS concept did.

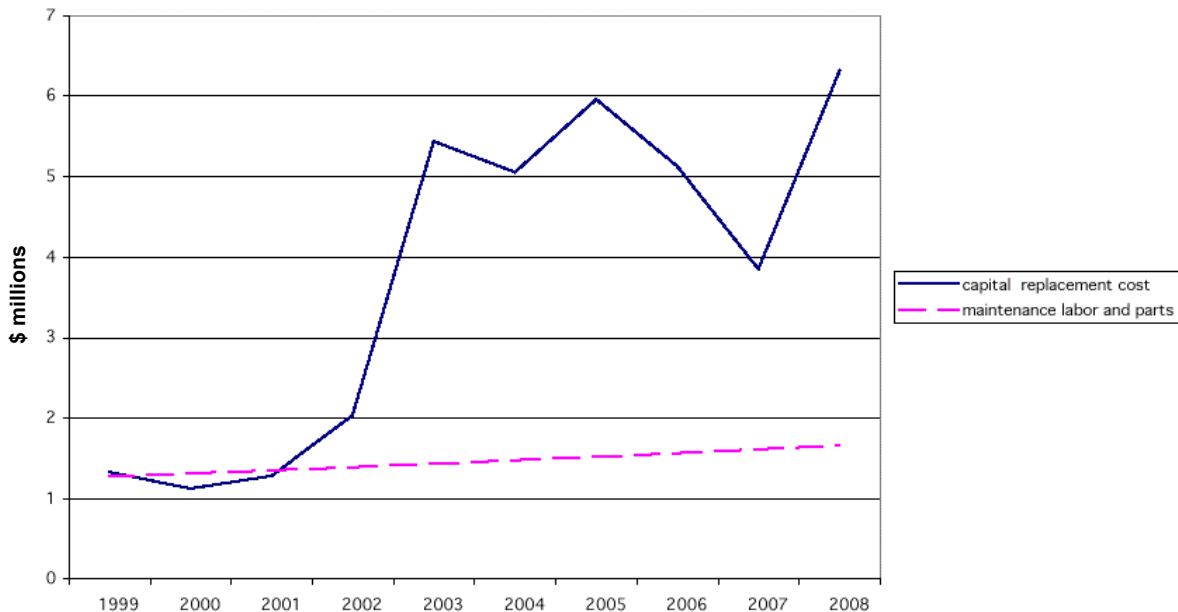
The new Asset Management System will not reduce staff involved in asset management, but will make it possible for the current staff to:

- Leverage their skills
- Make better decisions
- Do more proactive work in addressing the long-term equipment replacement needs of WTD.

The cost avoidance comes from not hiring more staff to perform this work, as the state and federal guideline requirements turn into mandatory requirements in the future. The Master Plan has not taken credit for any of these savings since they are difficult to quantify, but are known to be real.

Brown and Caldwell, consulting engineers, performed a study in 1996 for Metro that provided information for many (but not all) equipment assets in the wastewater system. This represents the best data currently available on WTD assets. From this study, WTD estimates that the CRV (current replacement value) of its 16,000 pieces of process equipment at all of its facilities is \$360 million. Further, the study developed capital replacement costs and maintenance labor and parts costs to replace major assets through 2008, as shown in Figure A-2. This represents a significant installed base of equipment that needs to be managed closely to determine the most cost effective replacement time. The Asset Management System project provides the tools to manage these assets.

Figure A-2: Major Asset Replacement Costs, 1999 to 2008



Source: Brown and Caldwell, 1996, WTD Asset Replacement Study

WTD has recently reorganized and formed an Asset Management section that is responsible for developing new equipment replacement strategies and management of WTD's assets.

From recent budget planning projections, it currently costs WTD \$30 million per year to maintain its equipment in terms of spare parts and equipment replacements, using the current asset management strategies. Based upon the Brown and Caldwell capital replacement projections in Figure A-2, the distribution of asset replacement was approximated, and this distribution was used in calculating the cost avoidance associated with having an asset management program and supporting management information systems in place.

The cost avoidance comes from:

- 3 percent per year reduction in the annual \$30 million asset maintenance cost incurred by WTD for the first 2 years
- 2 percent in the third year and beyond after each phase of the asset management project has been completed
- A total of 8 percent reduction after 3 years resulting in \$3 million per year in long-term cost avoidance. This is a very conservative number based on industry-wide savings and EPA estimates.

EPA estimates a 20 percent savings and private industry expects a 30 percent savings in capital equipment replacement costs and maintenance. The 3 percent savings used here is extremely conservative.

Included in this cost avoidance estimate is the increase in maintenance staff efficiency resulting from implementing a new maintenance management system, as addressed in the following subproject.

Subproject: Maintenance Management System Parts I & II, No. 40-102 & 40-103

Cost Avoidance: Equipment replacement costs and maintenance labor.

Maintenance management is an important element in effective asset management. The Division must develop sound maintenance management processes and automate those processes to achieve its objectives.

The Division's existing maintenance management system, MainSaver, cannot be considered to be fully implemented and working at the level required to support Division maintenance management processes. The implementation of MainSaver lacked executive sponsorship, funding, and project management commonly required to implement a Computerized Maintenance Management System (CMMS).

Some of the expected benefits of implementing effective maintenance management, including a CMMS, are as follows:

- Improved cost control of maintenance labor and materials resources
- Improved productivity through documented maintenance procedures and more efficient use of staff
- Optimized maintenance throughout the Division
- Improved responsiveness to incidents
- Extend useful life of infrastructure assets.

The Division needs to address two urgent matters with regard to its maintenance management system:

1. Establish consistent, Division-wide, maintenance and work management standards, procedures and work processes to guide the effective implementation of a CMMS.
2. Address new requirements from outside agencies to report on all maintenance activities as they relate to the condition of Division facilities and equipment.

These needs are addressed by implementing this subproject in two parts:

- Part I: Establish consistent, Division-wide standards, procedures and work processes for maintenance and work management. This step also evaluates the software required to support the newly established:
 - Standards
 - Procedures
 - Work processes.

During Part I, a Web-based CMMS, as well as various maintenance and work management applications, will be deployed via the Information Portal.

- Part II: Implement automated, real-time, data-level integration of the CMMS to other information systems:
 - Finance
 - Human Resources
 - Inventory Control
 - Engineering Document Management
 - CAD/GIS
 - Operations Decision Support System.

Increases in WTD productivity will occur gradually as the operations, maintenance and plant personnel learn how to utilize these maintenance management tools. A transition from a reactive maintenance strategy to a proactive strategy will occur. This will result in increased productivity in all skill areas. These tools allow maintenance staff to spend their time doing maintenance procedures that improve equipment reliability and longevity, rather than reacting to equipment failures.

It is assumed that a significant improvement in the productivity of existing staff will occur. This will result in limiting staff growth and contribute strongly to the success of the asset management program.

Cost avoidance will result in reduced capital spending over the next 10 years, as WTD's large installed base of aging equipment is replaced and preventive maintenance practices are applied to extend the life of the replacement equipment. The capital equipment cost avoidance was included in the Asset Management System subproject.

The cost avoidance from having a maintenance management system and an Asset Management System in operation have been combined in this analysis because both systems need to work together to produce the maximum benefit.

The following cost avoidance was previously described in the Asset Management System subproject above. The cost avoidance includes:

- 3 percent per year reduction in the annual \$30 million asset maintenance cost incurred by WTD for the first 2 years
- 2 percent in the third year and beyond after each phase of the asset management project has been completed
- A total of 8 percent reduction after 3 years resulting in \$3 million per year in long-term cost avoidance. This is a very conservative number based on industry-wide savings and EPA estimates.

EPA estimates a 20 percent savings and private industry expects a 30 percent savings in capital equipment replacement costs and maintenance. The 3 percent savings used here is extremely conservative.

Asset and Maintenance Management Systems Project Cost-Benefit Summary

The cost of this project is \$6,205,000 as summarized below.

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N40	New Asset & Maintenance Management Systems	\$6,205,000		\$665,000	\$1,125,000	\$1,390,000	\$1,140,000	\$790,000	\$185,000	\$550,000	\$360,000	\$0
Sub Project No.	Sub Project Name											
423N40 / 101	Asset Management System	\$1,950,000		\$400,000	\$600,000	\$600,000	\$350,000					
423N40 / 102	Maintenance Mgt System: Part I	\$3,160,000		\$265,000	\$525,000	\$790,000	\$790,000	\$790,000				
423N40 / 103	Maintenance Mgt System: Part II	\$1,095,000							\$185,000	\$550,000	\$360,000	

The cost avoidance from this project is \$7,350,000 through 2011 as summarized below. It will contribute to WTD's overall long-term stability and goal of becoming competitive with the private sector utilities in 10 years.

The gray-shaded years in the spreadsheet show the implementation phase for each subproject, followed by its contribution to cost savings by year.

Project No.	Project Name	Total Savings	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N40	New Asset & Maintenance Management Systems	\$7,350,000	\$0	\$0	\$0	\$0	\$0	\$450,000	\$900,000	\$1,800,000	\$1,800,000	\$2,400,000
Subproject No.	Subproject Name											
423N40 / 101	Asset Management System	\$3,600,000						\$450,000	\$450,000	\$900,000	\$900,000	\$900,000
423N40 / 102	Maintenance Mgt System: Part I	\$3,150,000							\$450,000	\$900,000	\$900,000	\$900,000
423N40 / 103	Maintenance Mgt System: Part II	\$600,000										\$600,000

1.4.4 Data Management Systems Project Benefits

The Data Management Systems Project will provide the computer systems to manage the Division's documents, specifications and drawings, including:

- Engineering Document Management System – Master Facility Drawings
- Wastewater Program GIS Database
- GIS-enabled applications via the Information Portal
- West Point Plant Facilities Data Repository – CAD Drawings.

Data Management Systems Project Cost Avoidance**Subproject: Engineering Document Management System Part II & III, No. 50-102 & 50-103**

Cost Avoidance: Maintenance, engineering, support staff labor, and contractor change orders.

This project will provide a number of benefits to the Division. This project:

- Increases productivity, reduces paper, automates workflow, and reduces time spent locating maps and documents associated with infrastructure assets
- Unifies all engineering document management efforts within the Division
- Improves support for changes to as-built drawings

- Facilitates collaborative efforts among engineering, plant and planning staff
- Improves the speed and accuracy of infrastructure planning and change decisions.

Part I of the Engineering Document Management System is included as part of the Project Control Project, which establishes engineering document standards and document identification labeling standards. It also moves existing CAD files to Portable Document Format (PDF) files for viewing by appropriate staff throughout the Division via the Information Portal.

Part II of the Engineering Document Management System is part of this project and includes upgrading the Division's existing AutoCAD system to the newest Web-enabled version. This will allow viewing of dynamic CAD maps via the Information Portal, by making use of GIS.

Part III of the Engineering Document Management System is part of this project and includes deploying a Web-based application via the Information Portal for the viewing and collaborative editing of CAD drawings.

These projects will allow WTD to proactively take control of over 20,000 existing drawings and bring the most important of these drawings up to a current as-built condition. The ease of access and correctness of these drawings contribute significantly to the minimum cost avoidance shown below. This will have a significant impact on reducing staff growth in the future as new facilities are added and WTD needs increase.

It should be noted that studies by the Delphi Group and the META Group regarding the automation of content and document management in engineering environments have clearly demonstrated significant cost avoidance. Typically, these savings are on the order of 30 percent, and increase to as high as 70 percent of total engineering and CAD labor costs.

Subproject: Data Management Part I & II, No. 50-105 & 50-106

Cost Avoidance: Maintenance, engineering, and support staff labor.

The implementation of a GIS-centric Infrastructure Data Management System is planned to take place in two steps, referred to as Parts I and II. These steps are summarized below.

Part I implements the Wastewater Program GIS Database, including:

- Database design
- Data standards
- Data conversion.

The GIS Database is to be hosted by the GIS Team as part of the Department of Natural Resources and Parks (DNRP) Information Technology organization.

Part II implements an initial series of priority GIS-enabled applications via the Information Portal. The applications implemented in this step will support asset and maintenance management.

Data about the Division's infrastructure—its facilities and equipment—is critical for effective operations and maintenance. This subproject implements a system for managing this critical infrastructure data in a GIS-centric technical platform. Current water/wastewater industry best practice is to make GIS the core technical platform for its infrastructure data management. The configuration and linkages of Division facilities can only be stored and utilized effectively with GIS technology.

Subproject: West Point Facilities Data Repository, No. 50-106

This subproject completes the long overdue work of updating the CAD drawings for the West Point Treatment Plant. It is assumed that much of the labor associated with completing these drawings will be provided by an outside contractor.

The data contained in West Point Treatment Plant CAD databases are essential for the ongoing operations management, as well as the asset and maintenance management of the West Point Treatment Plant. In addition, this data will prove highly valuable to the Division as a whole for planning and other business purposes.

The Division's need to have a complete set of CAD drawings for its West Point Treatment Plant facilities will be addressed by this subproject. The data contained within these CAD drawings is essential for the effective operations and maintenance of the West Point Treatment Plant. The database created by this subproject will integrate with other Division information systems, including:

- Engineering Document Management System
- Infrastructure Data Management System
- Asset Management System
- Maintenance Management System
- Others.

The minimum cost avoidance from implementing these subprojects includes:

- 3 percent reduction in treatment plant and conveyance system construction project change orders
- Increased efficiency of current personnel resulting in the work equivalent of 5 FTEs that will not have to be hired between now and 2011. This amounts to a cost avoidance of \$306,000 per year from the following areas:
 - Engineering and CAD personnel: 2 FTEs = \$122,400/year
 - West Point and South Plant craft labor: 2 FTEs = \$122,400/year
 - Planning and system development labor: 1 FTE = \$61,200/year.

The total savings is \$1,398,480 over the next 10 years, by avoiding hiring 5 FTEs.

Data Management Systems Project Cost-Benefit Summary

The cost of this project is \$6,720,000 as summarized below:

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N50	New Data Management Systems	\$6,720,000				\$325,000	\$1,720,000	\$1,875,000	\$1,340,000	\$1,160,000	\$300,000	
Sub Project No.	Sub Project Name											
423N50 / 101	Engineering Document Mgt: Part I	\$0										
423N50 / 102	Engineering Document Mgt: Part II	\$620,000					\$155,000	\$310,000	\$155,000			
423N50 / 103	Engineering Document Mgt: Part III	\$1,450,000							\$425,000	\$725,000	\$300,000	
423N50 / 104	Infrastructure Data Mgt: Part I	\$1,930,000				\$325,000	\$640,000	\$640,000	\$325,000			
423N50 / 105	Infrastructure Data Mgt: Part II	\$870,000							\$435,000	\$435,000		
423N50 / 106	West Point Facilities Data Repository	\$1,850,000					\$925,000	\$925,000				

The cost avoidance resulting from this project is \$1,398,480 through 2011 as summarized below. This project contributes to WTD's overall long-term stability and goal of becoming competitive with the private sector utilities in 10 years.

The gray-shaded years in the spreadsheet show the implementation phase for each subproject, followed by its contribution to cost avoidance by year.

Project No.	Project Name	Total Savings	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N50	New Data Management Systems	\$1,398,480	\$0	\$0	\$0	\$73,440	\$73,440	\$73,440	\$73,440	\$220,320	\$220,320	\$664,080
Sub Project No.	Sub Project Name											
423N50 / 101	Engineering Document Mgt: Part I	\$514,080				\$73,440	\$73,440	\$73,440	\$73,440	\$73,440	\$73,440	\$73,440
423N50 / 102	Engineering Document Mgt: Part II	\$440,640								\$146,880	\$146,880	\$146,880
423N50 / 103	Engineering Document Mgt: Part III	\$443,760										\$443,760
423N50 / 104	Infrastructure Data Mgt: Part I	\$0										
423N50 / 105	Infrastructure Data Mgt: Part II	\$0										
423N50 / 106	West Point Facilities Data Repository	\$0										

1.4.5 Network Enhancement Project Benefits

The WAN and LAN are the physical components of the Division's computer infrastructure. The actual wires, fiber optic cables, routers and servers allow data to be transferred from point to point. This project will upgrade these components as required to serve new applications. Additionally, new technologies will be introduced to the network, allowing it to function more efficiently and incorporate such features as:

- Information Portal to give users quick access to data in the format they
- Integration Bus to integrate disparate databases
- Web access to data, independent of location
- Mobile communications to allow more effective use of WTD resources and quicker response to emergencies
- Interface to I-NET.

Increased bandwidth will support the full use of video conferencing and other media requiring significant network resources.

Network Enhancement Project Cost Avoidance

Subproject: Information Portal Part I, II & III, No. 90-101, 90-102, & 90-103

Cost Avoidance: WTD management and staff labor.

This subproject initiates the construction of the WTD Technology Architecture (described in Appendix D) by implementing a Division-wide Information Portal. Later subprojects in this Network Enhancement Project will implement additional components of the Technology Architecture, including:

- Integration Bus (for data and workflow integration and automation)
- e-Business Connector (for Internet-based e-Business transactions).

As the Division continues to publish more information on its Intranet and as Web-based applications begin to be implemented within the Division, the need for an Information Portal becomes critical. Authoritative surveys of both commercial and governmental organizations that have implemented information portals attest to the tremendous return on computing assets that can be attained.

The Wastewater Treatment Division, as with many other governmental agencies, must commit significant funds to its computing capabilities in order to meet evermore stringent regulatory and operational requirements in the face of reduced labor resources. The productivity of its labor force must be maximized and information portals are a proven technology for achieving significant productivity and efficiency gains.

The Division's Information Portal will:

- Enhance the value of new and existing information technology assets
- Place the Division on the path toward e-Business, making possible:
 - e-Commerce (the procurement of supplies and services via the Internet)
 - e-Collaboration (ubiquitous, location-independent communication and coordination among employees and others).

A complete range of information and computing resources will be available to all authorized Division employees, such as:

- Documents, spreadsheets, memos, contracts, work orders, Web pages and e-mail messages
- Information and services from software applications including asset management, maintenance management, biological and chemical analyses, human resources, finance and others
- e-Business services being deployed to automate processes such as benefits administration, expense reporting, timekeeping and procurement
- Internet services such as wastewater regulatory updates, wastewater industry benchmarking and information hosted by other parties on the World Wide Web
- Division-wide forums that allow employees, other agencies and contractors to collaborate more effectively.

The Information Portal is to be implemented in two steps, referred to as Part I and Part II.

Part I accomplishes the following:

- Implements the core functional elements of the Information Portal
- Deploys an initial set of Web-based applications and data via the Information Portal, including applications for capital improvement subprojects reporting, asset management tracking and maintenance management.

Part II accomplishes the following:

- Implements more advanced functional elements of the Information Portal.
- Expands deployment of CIP, asset, maintenance, and subproject management.
- Deploys new applications, such as:
 - Operations Decision Support System
 - GIS maps
 - Budgeting Reporting
 - Information Systems
 - Others.

In summary, a WTD Information Portal provides a standard user interface for accessing all databases and applications, dramatically reducing training, support and maintenance requirements for Information Technology (IT) resources. The implementation of a WTD Information Portal provides both technical and business benefits.

The technical benefits include:

- Enhanced ability to manage documents
- Streamlined information distribution
- Integrated applications
- More cost-effective delivery of IT services
- Lower Intranet administration
- Reduced IT infrastructure costs.

The business benefits include:

- Less time spent searching for information
- Improved employee collaboration
- Lower training costs
- A unified view of business and operations
- Self-service applications for both customers and employees.

The Information Portal also positions the Division for future e-Business projects that are becoming more critical to governmental agencies.

The Information Portal will improve management of the content—the information, facts and documents—that are being published in ever-increasing volumes via the Division's Intranet (Web site).

Without the Information Portal, it is projected that the Division will need to increase Web support staffing or lower expectations of what can be published via the Intranet. By implementing the Information Portal, the following standardization occurs automatically:

- Standard authoring templates that automate formatting and information composition
- Consistent user views across WTD organizations
- Automatic application of access control; easy and secure logon
- Version control
- Personalization (have it your way within WTD's rule set)
- Assurance that published Division content on the Web has:
 - Visual consistency
 - Integrity
 - Audit quality.

All of this leads to increased productivity, by giving the users what they need, in their format, when they need it, without making numerous phone calls to request it, and without waiting days or weeks to get it.

Subproject: Integration Bus Part I & II, No. 90-104 & 90-105

Cost Avoidance: WTD management and staff labor

The Integration Bus is to be implemented in two steps, referred to as Part I and Part II.

Part I implements the data-level integration components of the Integration Bus, enabling priority applications within WTD to access WTD databases regardless of the data structure, data format, or database technology.

Part II implements the workflow automation components of the Integration Bus, enabling the automation of application-to-application links and reducing the reliance on human intervention to establish and maintain integrated applications.

The Integration Bus extends the functionality and capabilities of the WTD Information Portal, resulting in further productivity and cost avoidance benefits.

The business benefits include:

- Less time spent searching for information
- Improved employee collaboration
- Lower training costs
- A unified view of business and operations
- Self-service applications for both customers and employees.

Subproject: Mobile Connectivity Part I & II, No. 90-106 & 90-107

Cost Avoidance: WTD management and staff labor

Mobile connectivity is to be implemented in two steps, referred to as Part I and Part II.

Part I:

- Implements mobile information distribution capabilities of the Information Portal
- Delineates WTD-authorized wireless devices
- Configures mobile devices for access to the Information Portal.

Part II implements:

- Enhanced mobile information distribution capabilities
- Access to graphical information such as CAD and GIS
- 3rd Generation mobile devices within WTD.

Mobile networking and connectivity are rapidly becoming commonplace in utilities. The Division plans to improve field staff productivity by providing ready access to facilities and equipment information, including:

- Electronic operations & maintenance manuals
- Electronic work order status information
- Access to CAD and GIS maps by field staff
- Access by other WTD staff, including Division management, to a wide variety of information sources via mobile devices, thereby cutting down on the time and effort required finding and accessing information when needed.

The cost avoidance associated with the above subprojects is the result of avoiding hiring 15 FTEs, or \$918,000 per year by 2011. These savings are made possible by removing the information access roadblocks that exist today and putting the information quickly into the right user hands without being dependent on analysts. The efficiency of existing WTD staff will increase and their overall effectiveness will provide the work equivalent of 15 additional FTE resources during this planning period.

Workflow tools work very effectively in an integration bus environment and will be the key to even greater efficiency improvements in the future.

After 2011, an annual cost avoidance of \$1,475,000 per year in new staff can be achieved as this project is completed. This projected cost avoidance is well within the range of those seen in other industries and reported by various research organizations such as the Gartner Group. For instance, in a survey of telecommunications companies that have implemented an Information Portal and an Integration Bus, the overall cost savings were on the order of 15 percent of total labor costs.

Network Enhancement Project Cost-Benefit Summary

The Cost of this project is \$10,975,000 as summarized below:

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N90	Network Enhancement Project	\$10,975,000			\$330,000	\$410,000	\$1,465,000	\$1,900,000	\$1,900,000	\$1,530,000	\$1,720,000	\$1,720,000
Sub Project No.	Sub Project Name											
423N90 / 101	Information Portal: Part I	\$740,000			\$330,000	\$410,000						
423N90 / 102	Information Portal: Part II	\$1,935,000					\$645,000	\$645,000	\$645,000			
423N90 / 103	Information Portal: Part III	\$1,205,000								\$275,000	\$465,000	\$465,000
423N90 / 104	Integration Bus: Part I	\$1,815,000					\$605,000	\$605,000	\$605,000			
423N90 / 105	Integration Bus: Part II	\$1,815,000								\$605,000	\$605,000	\$605,000
423N90 / 106	Mobile Connectivity Part I	\$1,515,000					\$215,000	\$650,000	\$650,000			
423N90 / 108	Mobile Connectivity Part II	\$1,950,000								\$650,000	\$650,000	\$650,000

The cost avoidance resulting from this project is \$3,213,000 as summarized below. This cost avoidance contributes to WTD's overall long-term stability and goal of becoming competitive with the private sector utilities in 10 years.

The gray-shaded years in the spreadsheet show the implementation phase for each subproject, followed by its contribution to cost avoidance by year.

Project No.	Project Name	Total Savings	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N90	Network Enhancement Project	\$3,213,000			\$0	\$0	\$153,000	\$153,000	\$153,000	\$918,000	\$918,000	\$918,000
Sub Project No.	Sub Project Name											
423N90 / 101	Information Portal: Part I	\$918,000					\$153,000	\$153,000	\$153,000	\$153,000	\$153,000	\$153,000
423N90 / 102	Information Portal: Part II	\$918,000								\$306,000	\$306,000	\$306,000
423N90 / 103	Information Portal: Part III	\$0										
423N90 / 104	Integration Bus: Part I	\$918,000								\$306,000	\$306,000	\$306,000
423N90 / 105	Integration Bus: Part II	\$0										
423N90 / 106	Mobile Connectivity Part I	\$459,000								\$153,000	\$153,000	\$153,000
423N90 / 108	Mobile Connectivity Part II	\$0										

1.5 Deferred Projects Benefits

The deferred projects identified in Table A-4 are described in Appendix F. They are potential extensions to the Master Plan projects that have been recommended for implementation. However, due to lower priority ratings and lack of funds, these projects have been deferred to the future. They will be reviewed each time the Master Plan is updated (on a three-year cycle) to evaluate their need and benefit to WTD.

The deferred projects are listed below along with associated subprojects. Cost and schedule estimates and more detailed descriptions of these subprojects are provided in Appendix F.

The cost avoidance benefits associated with the deferred projects will be addressed in the next update of the Master Plan, for those projects that become part of the next plan. They are listed here to make it known that these are viable candidate projects to consider in the future.

Table A-4: Deferred Projects

<i>Projects</i>	<i>Deferred Subprojects</i>
Water Quality Systems	PIMS – Septage Biosolids Integration (30-102)
Asset and Maintenance Management Systems	Maintenance Management System Project – Part III (40-104)
Data Management Systems	Engineering Document Management System – Part IV (50-103)
	Infrastructure Data Management System – Part III (50-107)
	Infrastructure Data Management System – Part IV (50-108)
Training Support Systems	WTD Employee Information System (60-101)
Business Support	County Finance and HR Integration – Part I (70-101)
	County Finance and HR Integration – Part II (70-102)
Productivity Metrics	Budget Planning & Tracking System (80-101)
	Productivity Metrics (80-102)
Network Enhancement	e-Business: e-Commerce / e-Procurement Project (90-107)
	Mobile Connectivity – Part III (90-112)

1.6 Business Drivers

This Master Plan addresses a number of business drivers. WTD's Productivity Initiative is the primary business driver for the Master Plan. However, beyond the Productivity Initiative, there are other significant drivers that must be taken into consideration. These include new County-wide initiatives and requirements, best practices for operations that are being adopted by private utilities, new governmental regulations and the rapidly growing impact of e-Business.

1.6.1 The Productivity Initiative

The King County Wastewater Treatment Division has established a goal of becoming:

1. One of the best publicly operated wastewater utilities by 2005
2. Competitive with private sector wastewater utilities by 2010.

In support of these goals, WTD has initiated the Productivity Initiative, an employee-led effort to establish a plan and identify key strategies, milestones and employee incentives to become more efficient in delivering services to the public.

The Balanced Scorecard (excerpted from the Productivity Initiative Pilot Program Plan)

Historically, public wastewater utilities focused their measurement system and associated strategies primarily on water quality regulatory compliance and customer service. More recently, other issues have surfaced as being equally significant: operational efficiency, workforce changes to more knowledge workers, shifts to regionalization and privatization of wastewater operations and public demand for more accountable government. These other factors have shifted the primary focus more toward the measurement of costs and financial impacts. The Balanced Scorecard methodology helps modern wastewater agencies in balancing all of these factors so as to optimize business and operations. A Balanced Scorecard defines an organization's future success by setting objectives and measuring performance from four distinct perspectives or key drivers. The Productivity Initiative Pilot Program Plan has established these four key perspectives for WTD's Balanced Scorecard:

- The *People Management* (Learning and Growth) perspective directs attention to the basis of all future success—the organization's people and those systems and management practices that impact employee growth and satisfaction. A sound investment in these areas is critical to long-term success. WTD's adopted People Management performance indicators are:
 - Employee satisfaction
 - Employee retention
 - Employee development.
- The *Key Internal Processes* perspective focuses on the performance of core internal processes that drive the organization. Immediate and continuous improvement in key internal processes is a critical lead indicator of financial success in the future. WTD's adopted Internal Process performance indicators are:
 - Regulatory compliance
 - Safety
 - Infrastructure management
 - Innovative strategies.
- To convert key internal processes into financial success, public utilities must also meet their customers' and stakeholders' expectations. The *Customer Focus* perspective considers the organization through the eyes of the customer, so that the organization retains a careful focus on customer needs and satisfaction. WTD's adopted Customer Focus performance indicators are:
 - Customer and stakeholder satisfaction
 - Environmental excellence (measurements not defined yet).

- Finally, the *Financial* perspective measures the ultimate financial results that the organization provides to its customers and stakeholders. WTD's adopted Financial performance indicators are:
- Rate stability for WTD portion of the budget
 - Budget variance
 - Debt service coverage
 - Cost per million gallons per day of wastewater treated.

The Balanced Scorecard integrates critical performance measures into a few manageable metrics so that management has the necessary data to quickly assess the health of the organization on four critical fronts. For the past seven years, many companies have used the Balanced Scorecard to align objectives with the long-term strategy and mission of the organization.

A performance measurement system such as the Balanced Scorecard allows a public utility to align its activities with a strategic plan, which results in operational and financial efficiencies. It permits real deployment and implementation of strategy on a continuous basis. With it, a utility can get feedback needed to guide the planning efforts.

The recent reorganization of the King County Wastewater Treatment Program was initiated with the following objectives:

- Organize the wastewater program to deliver on the goals of the Productivity Initiative.
- Create consistency in operations and maintenance across the organization.
- Reduce the number of section managers within the wastewater program.
- Build better linkages between central office functions and work in the field.
- Focus on asset management and capital development programs for aging infrastructure, which must be maintained and ultimately replaced.
- Address salary inequities and salary compression issues created by the compensation system by upgrading some of the section manager positions.
- Demonstrate that wastewater managers, and the staff that they manage, will be asked to be more efficient.
- Position the wastewater program to make more strategic decisions in the areas of planning and operations.
- Retain existing levels of management (Division Manager / Section Manager / Supervisor / Staff) and not add any new levels of management and/or supervision.

1.6.2 New County-Wide Projects

Projects to be undertaken by King County as a whole can have enormous impact on the productivity and flexibility of WTD. Only one of these County projects is addressed here, the implementation of a new County-wide Accounting and Finance System.

Currently, the County has implemented Oracle Financials and PeopleSoft Human Resources software; however, these are not considered to be meeting the County's needs. The County is starting to formulate an information technology plan, which will include decisions on how to move forward. Among the options that the County is likely to consider:

- Remain committed to Oracle and its Applications product line and migrate to the latest version of Oracle Applications, which is a large-scale Enterprise Resource Planning, or ERP, software system termed Oracle e-Business Suite;
- Replace the existing Oracle Financials and possibly the PeopleSoft package as well, with a different large-scale ERP software system such as SAP.

Either of these options will place a downward pressure on WTD productivity for years to come, and this Computer Systems Master Plan has taken this into consideration. Implementing the systems recommended by this Plan will enable WTD to continue its productivity increases in the face of this County-wide project.

1.6.3 New Government Regulatory Drivers

WTD must take three new government regulatory initiatives into consideration as it makes business plans and plans for new computer and networking systems. These are GASB-34; the EPA's CMOM Audits; and the Information Technology Management Reform Act.

GASB-34

In 1999, in response to pressure to drive government agencies to account for funds and assets in ways more consistent with generally accepted accounting principles (GAAP), the Government Accounting Standards Board (GASB) issued Statement 34. GASB-34, is not yet mandatory, but significant pressure from major government investors and the federal government are likely to result in mandatory requirements before long. In the meantime, GASB-34 compliance is a prerequisite to demonstrating GAAP compliance and a compliance implementation schedule is already public.

GASB-34 establishes a new framework or "reporting model" for state and local government financial reports, which represents a momentous change in public sector accounting. Of special significance to the Division, GASB-34 has become one of the primary justifications for implementing new and upgraded financial management, maintenance management and asset management systems by state and local government agencies.

The new GASB-34 standard has come about in response to publicly expressed concerns about the inadequacy of public sector accountability. Accountability is the paramount objective of financial reporting for state and local governments. There are two separate and equally important aspects of accountability:

- *Fiscal accountability* requires that governments demonstrate compliance with public decisions concerning the raising and spending of public monies in the short term.
- *Operational accountability* requires that a government demonstrate the extent to which it has met its operational objectives efficiently and effectively, using all resources available for that purpose, and whether it can continue to do so.

The traditional government accounting model, with its strong emphasis on legal compliance, continues to provide a high level of fiscal accountability. But, this traditional accounting model

has provided little in the way of operational accountability and is considered woefully inadequate for this purpose.

GASB-34 directs governmental agencies to adopt a more “private sector-like” focus on accounting for assets. Specifically, GASB-34 requires that all capital assets, including general infrastructure assets, be capitalized in the financial statements at their historical cost or estimated historical cost. This rule will apply retroactively to major general infrastructure assets that were acquired in fiscal years beginning after June 15, 1980, or that received major renovations, restorations, or improvements since that date.

Traditionally, state and local governments have not consistently depreciated capital assets. The move to a more “private sector-like” focus on all activities in government-wide financial statements will change traditional practice. Governments will be required under the new financial reporting model to report depreciation expense for all their capital assets, including general infrastructure assets, in the government-wide financial statements. Governments, however, can avoid this mandate if (1) those assets are managed using an asset management system and (2) using the asset management system, the agency documents that its assets are being preserved at or above the condition level established and disclosed by the agency.

The EPA and CMOM Audits

In addition to the new regulatory demands coming from the Governmental Accounting Standards Board, there are also new regulatory demands coming from the Environmental Protection Agency. The EPA issued new guidelines for improved asset management by wastewater agencies and intends to make this mandatory. These emerging regulations revolve around two principal elements:

1. First, the EPA, in association with environmental consulting firms and specialists, issued the conceptual design for a comprehensive Environmental Management System (EMS). As the EPA envisions the role of the EMS in improved asset management in wastewater utilities, the EMS will serve as a repository of relevant data and reports about how general EPA regulatory compliance was achieved and whether or not the wastewater utilities can sustain its compliance. The EMS would need to be directly accessible by any external agency, including state and federal environmental regulatory agencies. Technologically, the EMS is a data warehouse that automatically captures relevant data from information and controls systems within the utility, automatically organizes the data for reporting, and automatically categorizes and then publishes the environmental data over the Internet via an Information Portal.
2. Somewhat later, the EPA has also issued guidelines for Capacity, Management, Operation and Maintenance (CMOM) audits by state environmental agencies and by the EPA. These audits would in effect require wastewater utilities to prove that they are taking an optimized approach to the management of their assets and operations. It is generally understood that CMOM audits would require wastewater utilities to have an integrated, utility-wide set of applications and databases that provide even more data and automated reporting and publication than the original EMS concept did.

Information Technology Management Laws and Guidelines

Recently, federal and state authorities have come under increasing pressure to manage information technology more effectively. This pressure, coming largely from legislators, is the result of what is considered to be a dismal record of information technology management demonstrated by government agencies over the past 10 to 15 years. In the face of rapidly changing information technology trends and the increasing complexity of information technology and information systems, government has largely been unable to receive the funding and sponsorship required for successful implementation of information technology. New federal laws and guidelines, such as the Information Technology Management Reform Act (ITMRA) and the Government Paperwork Elimination Act (GPEA), demand increased accountability by government for the implementation, ongoing maintenance and overall effectiveness of its information technology assets. When implemented through the defined projects, the methods and tools recommended by this Plan would position the Division in addressing these new laws and guidelines.

1.6.4 The Emergence of e-Business

Many industry pundits predict that e-Business (including e-Government and e-Commerce) will provide the platform for the Reinvention of Government. It delivers more efficient service, greater participation by stakeholders and improved governance. Some government agencies already have realized this and developed information portals and procurement exchanges that reduce paper and increase the speed of information dissemination. These agencies are using technologies like the Integration Bus and connecting outdated legacy systems to the World Wide Web. As a result, they are easing internal communications and knowledge-sharing and are becoming more efficient and effective. Government must keep its public satisfied through the use of e-Government strategies to enhance the public's perception of government agencies and departments.

Although governments—federal, state and local—have generally been slow to adopt new technology, the move to computing over intranets and the Internet has improved steadily. Numerous technology research organizations—Gartner, Forrester, Meta and others—expect that within two to three years citizens will see an increase in the level of online interaction with their governments. Many e-Government projects will be outsourced to private e-Business and e-Government specialists. Analysts predict spending for e-Government hardware, software and services at all levels will grow from \$1.25 billion in 2000 to more than \$6.5 billion by 2005.

This Master Plan—including, for example, the recommended implementation of the Information Portal and the Integration Bus—is intended to position WTD for the future world of e-Business.

1.7 Master Plan Alignment to Business Drivers

As described in this document, the Master Plan is closely aligned with all of the Division's significant business drivers. This alignment of each Study project with the identified business drivers has been summarized in Figure A-4. Clearly, all of the Study initiatives have significant relevance for the achievement of WTD business objectives in all areas.

Figure A-4: Master Plan Alignment to Business Drivers

<i>Business Driver</i>	<i>Plant & Offsite</i>	<i>Project Mgt.</i>	<i>WQ Mgt.</i>	<i>Asset / Maint. Mgt.</i>	<i>Infra-struct. Data Mgt.</i>	<i>HR</i>	<i>Bus Mgt.</i>	<i>Prod.</i>	<i>Comp. Infra.</i>
WTD Productivity Initiative	X	X	X	X	X	X	X	X	X
New County-wide Initiatives						X	X		X
Key Best Practices	X	X	X	X	X	X	X	X	X
New Government Regulations	X	X		X	X				X
e-Business							X		X

